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EXAMINER	
CHEN, KEATH T	

ART UNIT	PAPER NUMBER
1716	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/757,302	HE ET AL.	
	Examiner	Art Unit	
	KEATH T. CHEN	1716	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03/21/2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,8-11,13-16 and 18-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,8-11,13-16 and 18-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/21/2011 has been entered.

Response to Amendment

The claim amendment filed on 03/21/2011, addressing claims 1-2, 6, and 8-20 rejection from the non-final office action (11/22/2010) by amending claims 2, 8-9, 15-16, and 18-20; cancelling claims 1, 6, 12, and 17; and adding new claims 21-25 is entered, and will be addressed below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 2, 8-11, 135-16, and 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (US 6045671, hereafter '671), in view of Stirn (US 4596645, hereafter '645) and Bright et al. (US 6312525, hereafter '525).

'671 teaches some limitations of:

Claim 21: A combinatorial sputtering system (Fig. 14, col. 25, lines 23-24) for deposition (col. 25, line 29) may be used for catalysis (col. 31, lines 10-11, the claimed

"catalyst materials", note the different catalysts from the sputtering guns in order to screen the array for useful properties, col. 6, lines 6-7) using thin-film deposition techniques may include sputtering technique, electron beam or thermal evaporation, ... (col. 19, lines 39-51, these are known physical vapor deposition, the claimed "a physical vapor deposition apparatus for depositing combinatorial catalyst materials"), the substrate is located within a substrate holder 132 which, in addition to holding the substrate, also locks one secondary masking pattern 134 firmly above the substrate 118 (col. 25, lines 41-34, the claimed "on sample spots arranged on a substrate"):

a processing chamber 256 under vacuum (col. 22, lines 45-46, Fig. 12 clearly applicable to Fig. 14, the claimed "a deposition chamber" and "is sealable"), a substrate load-lock chamber 262 (col. 22, line 50, the claimed "that when open, receives the substrate" and "the chamber being openable after the substrate is processed so that the substrate with the sample spots can be removed therefrom"), the substrate is attached to a shaft 130 (col. 25, lines 27-28, the claimed "after the substrate is loaded upon a moveable central shaft that is vertically positioned at the center of the chamber");

eight RF magnetron sputtering guns 110 ... inserted from the side of the reaction chamber in a complete circle (col. 25, lines 24-27, the claimed "a plurality of plasma sources radially disposed within the chamber"), for catalysis (col. 31, lines 10-11, the claimed "depositing catalyst materials") with secondary masking pattern 134 firmly above the substrate 118 (col. 25, lines 41-34, the claimed "as sample spots on the substrate in a predetermined matrix"), a system 250 ... includes a processor (col. 22,

lines 66-67, the claimed "a program") film thickness and uniformity can be **controlled** by the spraying time, substrate-nozzle distance, … and/or **positioning the spray gun**, spray nozzle or substrate, etc. (col. 28, lines 25-28) the components can be delivered to predefined **regions** on the substrate …sequentially (col. 30, lines 44-46, the claimed "in accordance with coordinates defined by a program"),

The thickness monitors may provide feedback to the processor to control the deposition rate (col. 24, lines 57-59, as depositing rate is from the sputtering guns, the claimed "a control system controlling each gun"), the power of two electron beam sources can be varied so that component A is delivered to the substrate in increasing or decreasing amounts while component B is either delivered in a constant amount or varied in the opposite direction of component A. (col. 18, lines 31-34, the claimed "the control system providing (i) an amount of power to each gun to regulate a rate of catalyst material deposition"), film thickness and uniformity can be controlled by the **spraying time**, substrate-nozzle distance, … and/or positioning the spray gun, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed "(ii) an amount of time of deposition for each catalyst material to be deposited at a selected sample spot" as the control is intrinsically associated with each spot); the components can be delivered to predefined **regions** on the substrate …**sequentially** (col. 30, lines 44-46, the claimed "each such alignment occurring when the plasma guns in the plasma source are sequentially focused upon each sample spot as the substrate is positioned, and remains at a fixed position for a pre-set period, to create individual sample spots").

'671 further teaches the substrate is attached to a shaft 130 having linear and rotational motion (col. 25, lines 27-28) and during deposition, the substrate can be translated and rotated to face any one of the eight RF magnetron sputtering guns 110 (col. 25, lines 29-31), therefore, the movement of the shaft in the Z/axial rotation and x/vertical direction has to be coordinated with the sputtering guns 110. However, '671 does not explicitly teach the processor/control system also controls the vertical movement and axial rotation of the shaft does not explicitly teaches the linear motion in y direction.

'671 does not teaches the other limitations of:

Claim 21: (b) the plasma sources each comprising a cluster of separately controllable plasma guns, each gun depositing, according to the program, a predetermined catalyst material;

(c) (a control system controlling each gun) and the movement of the shaft according to the program, the control system providing (iii) an z, x and y coordinate position of the shaft, wherein, z defines axial rotation coordinates that align the sample spot with one of the radially disposed plasma sources, x defines vertical coordinates that align the sample spot with the same plasma source, and y defines horizontal coordinates that align the sample spot with the same plasma source.

Claim 2: the program comprises inputted parameters, the parameters determining for each selected spot, the amount of power, the amount of time, and the characteristics of the catalyst material type to be deposited by the plasma gun.

Claim 16: multiple guns are arranged in each of multiple clusters and the catalyst materials are deposited on the sample spots in layers in a programmed number of cycles.

Claim 22: the control system positions the substrate, selects the guns, and controls the amount of power and the duration of operation of the guns, such that different catalyst materials from the guns are applied to a given sample spot in at least one of a layer or a co-deposition.

In a different embodiment (Fig. 5), '671 teaches the substrate may also be **translated** relative to the frame 206 so that shutter masks 202, 203 may be positioned at selected regions on the substrate (col. 17, lines 44-46) instead of by moving the X--X and Y--Y shutter masks 202, 203 (col. 17, lines 40-41) and/or forming the two dimension pattern of Figs. 2-4. Therefore, needs a two dimensional motion mechanism.

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a two dimension motion mechanism (the limitations of 1B), as taught by Fig. 5 of '671, to the combined apparatus of '671 and '645, for the purpose of forming two dimensional pattern in Figs. 2-4 of '671.

'645 is an analogous art in the field of reactive sputtering of semiconductor film (title, similar to '671's sputtering). '645 criticizes the original three vertical S-Guns not suitable for co-sputtering (col. 3, lines 65-67) and the modification was to reshape ... so

there is one sputtering gun 31 mounted with a vertical sputtering axis directly below the center of a substrate holder 32, and two S-Guns, 33 and 34, one on each side, each having its sputtering axis at an angle from the vertical and pointing at the center of the substrate holder 32 (Fig. 2, col. 3, lines 2-8, sputtering guns 33, 34, 35, together, is the claimed "a cluster of separately controllable plasma guns", note the dictionary definition of cluster "a small group of things that are very close to one another", see onelook.com).

'525 is an analogous art in the field of modular architecture for semiconductor wafer fabrication equipment (title) including PVD (col. 5, line 50). '525 teaches a modular control system 200 with a host controller 202 for controlling the **overall operation** of the modular vacuum system 10 (col. 11, lines 22-24) including wafer handling and environment management (col. 11, lines 47-48, see also Fig. 14) and a user human/machine interface that provides the user with all of the commands for creating the desired vacuum system (col. 12, lines 45-50).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced **each of the sputtering guns 110** in Fig. 14 of '671 with the **S gun assembly** of '645, for the purpose of co-sputtering, as taught by '645 (col. 3, lines 65-67) and required by '671 (col. 18, lines 28-38). Note as '671 requires groups of guns when substrate facing different direction (the claimed "multiple guns are arranged in each of multiple clusters" of claim 16). Furthermore, to have implemented a control system for controlling the overall operation of the system, as

taught by '525, including the control of shaft in x, y, z directions, for the purpose of integral control of the system, including wafer handling (col. 11, lines 47-48). Therefore, to have had the control functions of the overall system in a program of the processor (the limitations of 21(c), 16, and 22).

'671 further teaches the resulting material include inter-metallic material, metal alloys (col. 9, lines 21-22, the claimed "the catalyst material is a metal", part of claim 23).

For claims 23-25, how the sample spot are deposited on the substrate sample spots are an intended use of the apparatus. Applicant's claim requirements "the sample spot comprises multiple layers with a single metal in each layer"; "the catalyst materials are co-deposited in each layer to form ternary alloys"; and "having layers of alternating co-deposited quaternary alloys" are considered intended use in the pending apparatus claims and the above combined apparatus, with multiple sputtering gun pointing to the substrate, is capable of. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (*Walter*, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (*In re Casey*, 152 USPQ 235 (CCPA 1967); In re

Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (*In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

In view of the pattern (col. 12, lines 44-50) in Figs. 1-2 of '671 also teaches the "the multiple separately defined selected spots of the substrate are arranged in the matrix defined by columns and rows" of claim 8 and "the relationship of the number (N) of separately defined spots in the rows and a number of separately defined spots in the columns is $rows_N = columns_N$" of claim 9.

'671 further teaches a system 250 ... includes a processor (col. 22, lines 66-67, the claimed "program") film thickness and uniformity can be controlled by the **spraying time**, substrate-nozzle distance, ... and/or **positioning the spray gun**, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed "includes selection of 1) an ion emitted by each plasma gun within a cluster; 2) the amount of power and the duration of operation for the gun; and 3) the position of the substrate, such that each selected spot of the substrate is exposed to the plasma gun at the selected power and at the selected duration" of claim 15 and "the control system positions the substrate and selects certain plasma guns and controls the amount of power and the duration of operation of the guns in essentially the same operation such that different catalyst materials from each gun are co-deposited with respect to a given sample spot on the substrate" of claim 19;

and "control system positions the substrate and selects certain plasma guns and controls the amount of power and the duration of operation of the guns in essentially the same operation such that different catalyst materials from each gun are deposited as layers with respect to each sample spot on the substrate" of claim 20, note the cluster guns imported from '645 would have required the control of each plasma gun within a cluster and simultaneous co-deposition of '671, col. 18, lines 28-38).

The feedback control of '671 (col. 24, lines 57-59) and feedback control of '525 (col. 11, lines 59-61) are intrinsically based on the operation of "values from an actual sample spot created at a set power, time and composition are compared to expected values and the programmed parameters for power, time and composition for that sample spot are adjusted if the actual spot values vary from the expected values" of claim 18).

For "the relationship of the number (N) of separately defined spots in one column to the number of separately defined spots in an adjacent column is spots in column$_N$ = N and spots in adjacent column$_{N+1}$ = N+1" of claim 10 and "the relationship of the number of separately defined spots in one row to the number of separately defined spots in an adjacent row is: spots in row$_N$ = N and spots in adjacent row$_{N-1}$ = N-1" of claim 11, it is merely how the columns and rows are viewed. By turning the substrate 45° and name columns and rows in vertical and horizontal direction, the number of spots in each

column and row will have a different count of spots (one less) than its neighboring column and row.

2. Claims 13-14, and alternatively for claims 10 and 11, are rejected under 35 U.S.C. 103(a) as being unpatentable over '671, 645, and '525, further in view of Wang et al. (US 20050035002, hereafter '002).

'671, '645, and '525, together, teach all limitations of claim 21, as discussed above. Figs. 12-14 show the center location of the substrate, therefore "the substrate comprises a side surface of a block positioned within the central location of the chamber" of claim 13, but it has discrete rectangular sample spots in an array instead of discrete cylindrical shape in an array.

'671, '645, and '525, together, do not teach the limitations of:

Claim 13: the block having a multiplicity of cylindrical substrate elements extending from the side surface thereof, each cylindrical substrate element individually defining a selected spot, the cylindrical substrate elements maintained in an array of columns and rows formed within the block, in which the upper surfaces of the cylindrical substrate elements comprise the discrete spots exposed to the sources.

Claim 14: the cylindrical substrate elements are inset within the block in a matrix and a plate having a plate matrix of openings concentric with the matrix of elements in the block is applied facing the surface of the block, such that the openings in the plate are aligned with the elements and a cross-section area of an opening in the plate is less

than a cross-section area of the surface of the corresponding concentric cylindrical element.

'002 is an analogous art in the field of electric screening system (title) in the detachable electrode arrangement provides an electrode array for combinatorial synthesis ([0067], second last sentence) applicable to physical vapor deposition PVD ([0062], second sentence). '002 teaches cylindrical inserts 38 ([0042]) in a holder 170 includes a holder block 171 and a back plate 180 which holds RDE 20 in place ([0068], see also [0066], Figs. 15-16), a holder block 171 (Fig. 15 and 16, [0070], the claimed plate) with the openings 172 sized to be slightly smaller than the outside diameter of electrodes 20 for light press fitting of the electrodes 20 to the holder block 171 ([0070], second last sentence, note 20 corresponds to the claimed inset).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the holder arrangement including cylindrical insert, a holder block/plate with opening smaller then the electrodes/inset, as taught by '002, in the combined apparatus of '671, '645, and '525, for its suitable use as a holder for the combinatorial synthesis in the PVD system. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

For claims 9 and 10, Figs. 15 and 16 clearly shows the relationship of column and row having the one less (or more) spots than neighboring column and row.

Response to Arguments

Applicant's arguments filed on 03/21/2011 have been fully considered but they are unconvincing in light of the new grounds of rejection above.

3. Applicants argued that Stirn '645's guns on each side of the center gun is not a cluster, see the third paragraph of page 6.

This argument is found not persuasive.

The examiner maintains the guns 33, 34, and 35 are in a close group, therefore, a cluster according to the definition in "a small group of things that are very close to one another", see onelook.com.

Furthermore, these guns are to deposit the substrate in one orientation. In combination with '671 when the substrate is rotated around the axis, different groups/cluster of guns are needed.

Still furthermore, previous cited reference US 20020000779 (Fig. 9) clearly shows how to construct a compact cluster of guns.

4. Applicants pointed out that US patent 7544574 is not a prior art, see the 2nd paragraph of page 7.

The examiner thanks this correction and reconsidered that '574 reference is not needed in rejection, as the column and row relationship is merely a view of the direction of columns and rows on the substrate. The examiner further cited references US

20030082587 (Fig. 6, A3) and 6996550 (Fig. 3, the drawing on right hand side) that show such relationship. The examiner further notes that '574 reference was used in several office actions ago.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 20030082587 (Fig. 6, A3) and 6996550 (Fig. 3, the drawing on right hand side) each shows the relationship of columns and rows of claims 10 and 11.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEATH T CHEN/
Examiner, Art Unit 1716